

Note ** Integrals can be evaluated with a calculator unless otherwise indicated**

1) Given the supply and demand functions: $D(x) = (x-9)^2$ and $S(x) = x^2 + 2x + 1$ where x is the units and $D(x)$ and $S(x)$ is the price in dollars, find each.

- a) The equilibrium point
- b) The consumer's surplus at equilibrium
- c) The producer's surplus at equilibrium
- d) Graph $D(x)$ and $S(x)$ and indicate all of the above.

2) An economist produced the following Lorenz curves for the distribution of total assets in the U.S. in 1963 and 1983 respectively: $L_1 = x^{10}$ (1963) and $L_2 = x^{12}$ (1983). Find the Gini Index for each Lorenz curve and interpret/compare the results.

3) Find the future value of an income stream where \$100 is deposited the first month and is increased by \$10 each month thereafter for 10 years and earns 6% annual interest compounded continuously.

4) You wish to have a scholarship in your name for \$1200 each year to a deserving business student, awarded indefinitely. How much should you donate, at 5.5% interest compounded continuously, to establish your scholarship?

5) A restaurant determined the length of time t , in minutes, that a customer must wait for an order has a probability density function of: $f(t) = 0.02e^{-0.02t}$ for $t \geq 0$

- a) Find the probability that a customer will wait no more than 20 minutes
- b) Find the probability a customer must wait more than 15 minutes for an order

6) Solve the differential equations:

a) $\frac{dy}{dx} = \frac{10x^4}{y}$

b) $\frac{dy}{dx} = 6x^2 + 2$ and $y = 8$ when $x = 0$

c) Find $R(x)$ given $MR(x) = R'(x) = 8x^3 - 3x^2 + 4x - 5$ and $R(x) = 146$ when $x = 3$

d) $\frac{dp}{dc} = 8c^2 p$

